

**REMARKS**

Claims 1-8, 10, 13-20, 22, 25-32, 34, 39, 43-51, 55-57, and 59-64 are pending. Claims 9, 11, 12, 21, 23, 24, 33, 35-38, 40-42, 52-54, 58, and 65-69 have been cancelled. Claims 1-5, 7, 10, 13-20, 22, 25-32, 34, 39, 43-49, 55-57, and 59-64 have been amended. No new matter has been introduced. Reexamination and reconsideration of the application, as amended, are respectfully requested.

In response to the restriction requirement under 35 U.S.C. § 121 set forth in the July 2, 2004 Office Action, Applicant elects, without traverse, for the continued prosecution of claims 1-10, 13-22, 25-34, 38-69. Claims 11, 12, 23, 24, 35-37 have been cancelled without prejudice.

In the July 2, 2004 Office Action, the Examiner objected to the drawings. Specifically, the Examiner objected to Fig. 6, Fig. 10, Fig. 9, and Fig. 15. Applicant has amended the specification to obviate the need for drawing corrections to Fig. 6 and Fig. 10 in accordance with the Examiner's suggestions. The Examiner objected to the FIG. 9 and FIG. 15 because the figures need a "prior art" label. Applicant has enclosed a redlined version of FIG. 9 and FIG. 15, and provided a replacement FIG. 9 and FIG. 15 labeled "Prior Art". The Examiner objected to the specification for various informalities. Applicant has amended the specification. Applicant notes that the specification has been amended to delete the reference to equation 1. The Examiner objected to claims 42-44, 46, 48, 58, 59, and 62-64 because the claims recite "the images" or "said images" without sufficient antecedent basis in the claims. Applicant has amended the independent claims corresponding to this set of claims to provide proper antecedent basis. The Examiner objected to claims 5 and 17 because the word "exits" should be

replaced with “exists”. Applicant has amended claims 5 and 17. The Examiner rejected claims 49 and 64 under 35 U.S.C. §112, second paragraph, as being indefinite.

Applicant has amended claims 49 and 64 in accordance with the Examiner’s remarks.

The Examiner rejected claims 52 and 65 under 35 U.S.C. §112, first paragraph, as failing to comply with the enablement requirement. Applicant has cancelled claims 52 and 65.

The Examiner rejected claims 52, 65-66, and 68-69 under 35 U.S.C. §102(b) as being anticipated by Niem (“Error Analysis for Silhouette-Based 3D Shape Estimation from Multiple Views”, WSHNCH3DI 1997). The Examiner rejected claims 1-4, 7, 10, 13-16, 19, 22, 25-28, 31, 34, 38-49, and 54-62 under 35 U.S.C. §103(a) as being obvious over Niem, in view of Battle, et al. (“Recent Progress in Coded Structure Light as a Technique to Solve Correspondence Problem: A Survey”, Pattern Recognition, Vol. 31, 1998). The Examiner rejected claims 5-6, 8-9, 17-18, 20-21, 29-30, and 32-33 under 35 U.S.C. §103(a) as being obvious over Niem, in view of Battle, in further view of Wojciech et al. (“Image-Based Visual Hulls”, SIGGRAPH 2000). These rejections are respectfully traversed.

**Independent claim 1, as amended, recites:**

A three dimensional modeling apparatus for generating three dimensional shape data of a three dimensional object, comprising:

projection means for projecting coded pattern light onto said three dimensional object;

image input means for inputting images of said three dimensional object including a first image capturing device and a second image capturing device;

rough shape calculation means for calculating a rough shape of said three dimensional object;

detailed shape calculation means for calculating a detailed shape from said images; and

three dimensional shape data generating means for generating three dimensional shape data of said three dimensional object based on said rough shape and said detailed shape, wherein said three dimensional shape data generating means determines said detailed shape using at least one final object surface location candidate selected from a plurality of object surface location candidates based on matching a coded light pattern region of a first image captured by the first image capturing device to a predetermined coded light pattern region of a second image captured by the second image capturing device and determining that the at least one final object surface location candidate is located in a predetermined region where the object surface can exist, said three dimensional shape data generating means generating three dimensional shape data of said three dimensional object based on said at least one final object surface location candidate.

The Examiner rejected claims 5-6, 8-9, 17-18, 20-21, 29-30, and 32-33 under 35 U.S.C. §103(a) as being obvious over Niem, in view of Battle, in further view of Wojciech. In doing so, the Examiner stated “though it can be argued that, in the extended SFS/SL method of Niem and Battle et al., the step of generating three dimensional shape data includes determining a final object surface location candidate from a plurality of object surface location candidates based on a region where the object surface can exist and generating three dimensional shape data

of said three dimensional object based on said final object surface location candidate, this step is not explicitly shown by either of Niem or Battle et al.”

The Examiner also stated that “Wojciech et al. discloses an SFS method employing the concept of *visual hulls*. A visual hull is volumetric representation formed essentially of the intersections of silhouette cones. It will always contain the object. Refer to *Visual Hull* in Section 2 and Fig. 1 of Wojciech et al. Again concave surfaces cannot be accounted for (last sentence of paragraph 2 of *Visual Hull* in Section 2 of Wojciech et al.). In this manner, the visual hull represents a rough shape, as discussed before. Wojciech et al. refine this model by “carving” away (*calculatus eliminatus* – Wojciech et al. page 1, right column paragraph 1) regions inside the visual hull where the object is not. In other words, the surface and inside of the visual hull represents a “region where the object surface can exist”. Points inside the visual hull would therefore constitute surface location candidates. (Points that are marked visible [Wojciech et al. page 4, right column paragraph 1] could also be considered location candidates).”

Neither the Wojciech reference, the Niem reference, or the Battle reference discloses, teaches, or suggests the apparatus specified in independent claim 1, as amended. Unlike the apparatus specified in independent claim 1, as amended, the above references do not show “three dimensional shape data generating means for generating three dimensional shape data of said three dimensional object based on said rough shape and said detailed shape, wherein said three dimensional shape data generating means determines said detailed shape using at least one final object surface location candidate selected from a plurality of object surface location candidates **based**

**on matching a coded light pattern region of a first image captured by the first image capturing device to a predetermined coded light pattern region of a second image captured by the second image capturing device and determining that the at least one final object surface location candidate is located in a predetermined region where the object surface can exist, said three dimensional shape data generating means generating three dimensional shape data of said three dimensional object based on said at least one final object surface location candidate”.**

Applicant respectfully submits that the above cited references do not teach the invention as specified in independent claim 1, as amended. Accordingly, Applicant respectfully submits that independent claim 1, as amended, distinguishes over the above-cited references. Claims 5-8, 10, 39, 43, 45, 46, and 50 depend directly or indirectly from independent claim 1, as amended. Therefore, Applicant respectfully submits that claims 5-8, 10, 39, 43, 45, 46, and 50 distinguish over the above-cited references for the same reasons as set forth above with respect to independent claim 1, as amended.

Independent claims 2-4, 13-16, and 25-28, as amended, recite limitations similar to independent claim 1, as amended. Specifically, independent claims 2-4, 13-16, and 25-28, as amended, recite “three dimensional shape data generating means for generating three dimensional shape data of said three dimensional object based on said rough shape and said detailed shape, wherein said three dimensional shape data generating means determines said detailed shape using at least one final object surface location candidate selected from a plurality of object surface location candidates **based on matching a coded light pattern region of a first image captured by the first**

**image capturing device to a predetermined coded light pattern region of a second image captured by the second image capturing device and determining that the at least one final object surface location candidate is located in a predetermined region where the object surface can exist, said three dimensional shape data generating means generating three dimensional shape data of said three dimensional object based on said at least one final object surface location candidate”.**

Accordingly, Applicant respectfully submits that independent claims 2-4, 13-16, and 25-28, as amended, distinguish over the above-cited reference for the same reasons as set forth above with respect to independent claim 1, as amended. Claim 44 depends from independent claim 3. Claims 17-20, 22, 55, and 59 depend, directly or indirectly, from amended independent claim 13. Claims 29-32, and 34 depend, directly or indirectly, from amended independent claim 25. Therefore, Applicant respectfully submits that claims 17-20, 22, 29-32, 34, 44, 55, and 59, as amended, distinguish over the above-cited references for the same reasons as set forth above with respect to independent claim 1, as amended.

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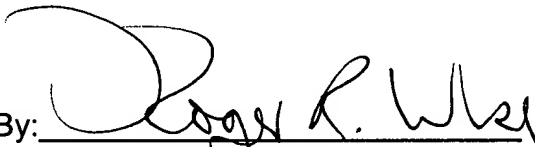
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Applicant believes that the foregoing amendments place the application in condition for allowance, and a favorable action is respectfully requested. If for any reason the Examiner finds the application other than in condition for allowance, the Examiner is requested to call the undersigned attorney at the Los Angeles telephone number (213) 488-7100 to discuss the steps necessary for placing the application in condition for allowance should the Examiner believe that such a telephone conference would advance prosecution of the application.

Respectfully submitted,

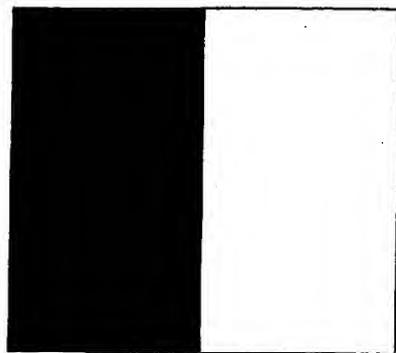
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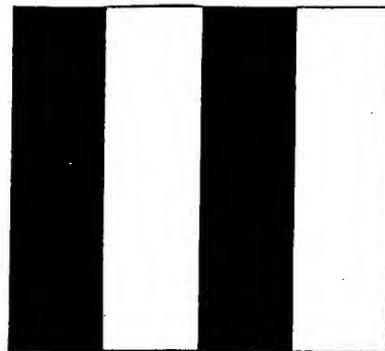
Roger R. Wise  
Registration No. 31,204  
Attorney for Applicant(s)

Date: January 3, 2005.

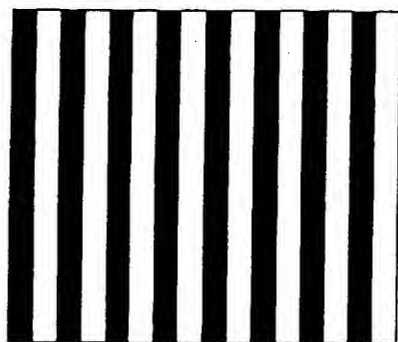
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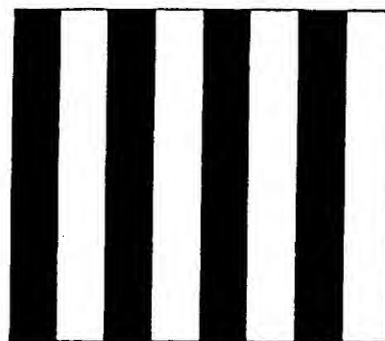
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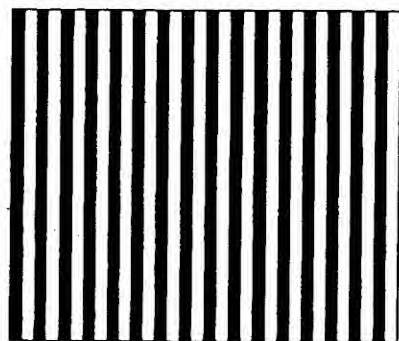
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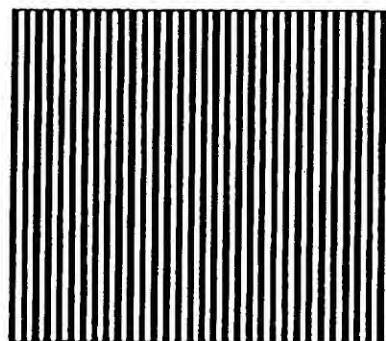
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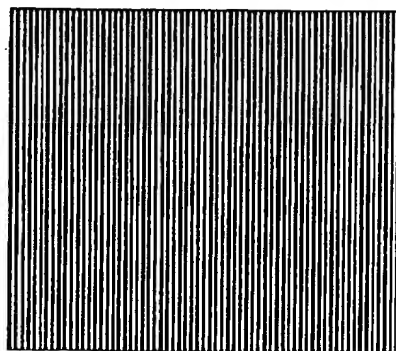
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(G)

Fig. 9  
PRIOR ART



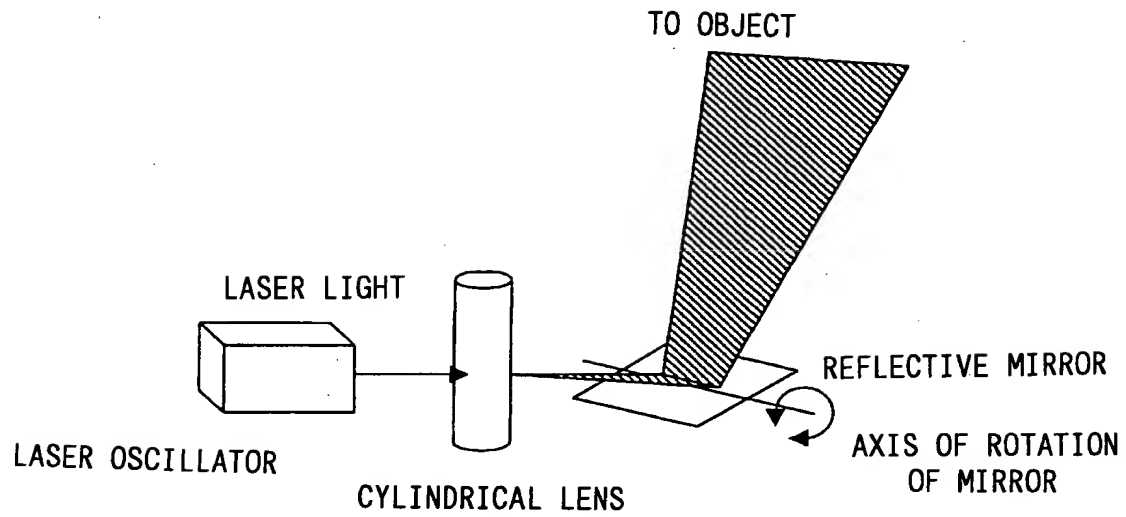


Fig. 15

PRIOR ART

**IN THE DRAWINGS:**

Please amend FIG. 9 and FIG. 15 as shown in red on the attached copy thereof, and substitute the enclosed FIG. 9 and FIG. 15 (as amended) for FIG. 9 and FIG. 15 as originally filed.